

Meeting Minutes

Team: Rolling Timber II

Last update date: Nov-4

Week 1 (Aug 20 – Aug 24)

Aug-21, Tuesday

- General Session #1

Aug-22, Wednesday

- **The first client & lead instructor meeting in Fall 2018 Semester**
 - The contents that we reported to the client
 1. We reported the testing results from the volunteering week (Aug 6 – Aug 10)
 2. Vibration is causing the data disturbance and “before and after” problem for our data (the end value of signal doesn’t go back to the initial value when we don’t put any weight on the measuring plate)
 3. Horizontal mounting for the load cell seems to be less affected by the vibration due to pre load from the measuring plate
 - The feedback from our client and lead instructor
 1. Do not stick with digging the reason why vibration is happening. Try to move on new things for more testing.
 2. Make sure to start with the easiest things first such as rubber insulation pads.
 3. Make sure there is no issues with electrical components. Try integration function and some filters on LabVIEW to have smoother data.

Aug-22, Wednesday

- Discussed the project schedule for this coming 4 weeks.
- From the load cell testing, it was found that our load cell is causing the drifting readings before and after the impact.
- From the load cell testing with/without rubber insulation pads, we got the similar results but found that the rubber pads prevented the vibration.

Aug-24, Thursday

- We tested the loadcell itself to see before and after signal differences. We found that the load cell was giving us a different signal before and after.

- We also did some tests on the rubber isolation pads on the floor. We dropped a 200 gram mass in the same spot from the same height onto the floor. We set the arm system on the concrete AND on the rubber mats. We tested each config several times and we got similar results.

Aug-25, Friday

- We installed a thin rubber between the load cell and the impact plate. These tests have showed extremely positive results. Now that the signal is starting and stopping at the same value we can see that the 45 Degree Mount does indeed result in better data.

Week 2 (Aug 27 – Aug 31)

※Note: Since Miyako Nakayama who is in charge of meeting minutes was not here for the whole week 2, Nakayama is highlighting what was going on in the week 2 rather than day-by-day record.

- **Mechanical components of our prototype:**
 - When the rubber insulation material was put between the load cell and the measuring plate, the data acquisition for 45° load cell mount presented the better result.
 - Moisture sensor is coming back to our place. The manufacture checked it, however, they insisted that there was no problem with it.
 - Make the system to let augers off when the signal from LabVIEW is off while letting augers on when the signal is on. (This is not urgent problem for our detailed design review).
 - Make the comparison table for the detailed design review (Prototype vs. full-scale) to show people what problems are solved and what problems are not solved yet using the experimental graphs and pictures
 - Brainstorm maintenance and operation of mass flow rate sensor after implementation:
 - A. How often a rubber insulation material should be replaced?
 - B. What is the best way to fit the rubber insulation mat to the measuring plate considering easy maintenance?
 - C. What is the best way to mount load cell for the easy loadcell replacement?
 - Ask Scott to see if he can make the full-scale (6' measuring plate) for us
- **Electrical components of our prototype:**
 - Take into account natural frequency ω_n for our coding

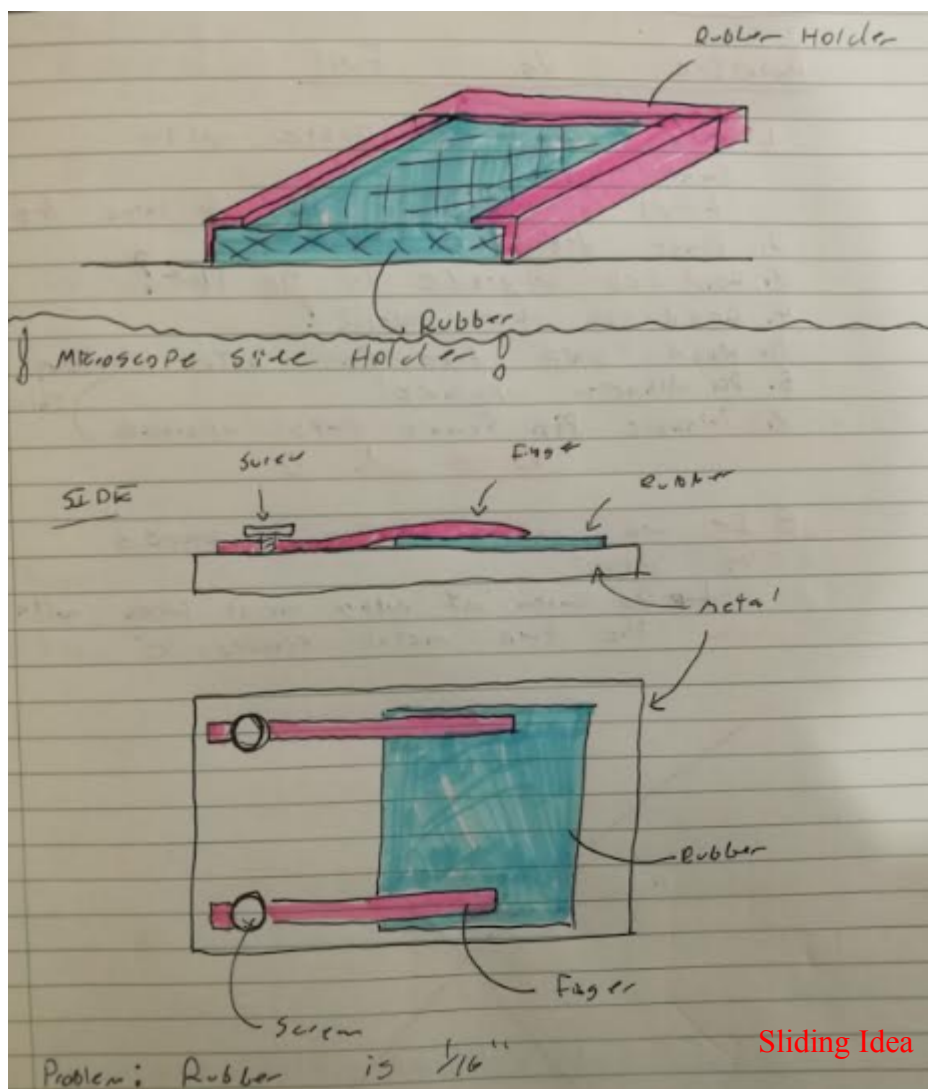
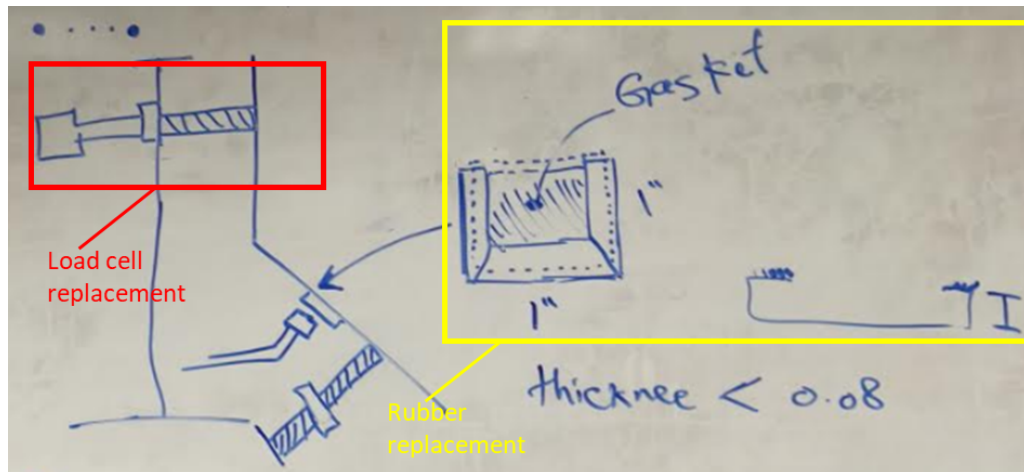
- The mass flow rate can be obtained by coding LabVIEW properly now
- Use integrate and some logic commands allowed us to take average out both positive and negative signals to output reasonable values.
- Problem for coding: Mass flow rate meter does not go back to the initial values properly when the force acting on the loadcell reached the certain values. This is our coding problem and can be solved by modifying the logic commands on LabVIEW.

# of Rank	Name of tasks	Target date to be done by	Done?
0	Email and aks Scott to see if he can make the full-scale (6') measuring plate for us	8/30 (Fri)	Done
1	Brianstorm and finalize the best way to mount the loadcell and rubber mat for easy maintenance	9/5(Wed), 2018	
2	Identify unsolved/solved problems for the comparison table		
3	Identify the details for easy operation and maintenance		
4	Natural frequency calculation		
5	Make the system to let augers off when the signal from LabVIEW is off while letting augurs on when the signal is on.		
6	Resume working on moisture sensor		

Week 3 (Sep 4 – Sep 7)

Sep-4, Tuesday

- We discussed the most important three tasks on the table above and prepared for the 3rd client meeting.
- 1. Brainstorm and finalize the best way to mount the load cell and rubber mat for easy maintenance**
 - A. Load cell replacement: A screw idea
 - ➔ A piece of metal and a screw will be mounted on the I beam. Whenever we want to lift the measuring plate, the screw just needs to be rotated and it will push the measuring plate up.
 - B. Rubber replacement:
 - Gasket idea:
 - ➔Gasket (a small pocket to insert a rubber sheet). The rubber sheet is easily replaced whenever we need maintenance.
 - Sliding idea:
 - ➔ The rubber sheet will be supported by two small metal arms. The rubber is easily replaced, however, it might fall down due to vibrations in the plant.



Sliding Idea

2. Comparison table (prototype vs. full-scale) & Unsolved problems in our project

Comparison table

		Prototype	Full-scale
Loadcell	Type of loadcell	LC 302-25	Might be changed
	Support structure	Nominal size	Might be changed according to the change of the loadcell type
	Cable	Nominal size	Might be longer
	DAQ	USB-6001	Might be changed
Rubber mat	Type of rubber	Rubber sheet from the lab	Rubber with desirable hardness and good ability to absorb vibrations
	Dimension of rubber	Nominal size	Might be changed according to the change of loadcell type
	Thickness of rubber	1/16"	1/16"
ME structure	Hinge/support diameter	Nominal size	Might be bigger
	Free-fall height	Nominal size	Might be longer and cause more impact on the plate

Unsolved problems in our project

- Moisture sensor
→ The manufacture told us that there was no problem with our moisture sensor and it is on the way back to Moscow from Austria.
- Vibrations in the actual plant (Natural frequency)
→ Vibrations from the plant will significantly affect our data signals. Mia and Mike will research this topic for our ME 430 (Senior Lab) course.
- LabVIEW coding problem
→ There is still a value drifting issue on LabVIEW

3. Identify the details for easy maintenance and operation

- Estimation of rubber life cycle can be estimated using a spec sheet. (i.g. hardness, dryness, etc)
- Clean environment has to be secured. (i.g. Make sure there are no dust between throat and the measuring plate)
- Safety for maintenance has to be achieved.
 - Maintenance people should be careful when they replace the load cell and the rubber sheet, or rotate the thread to lift the measuring plate.
- Use lubricant for any connection of the rigid structure
- Corrosion protection

Sep-5, Wednesday

- The third client meeting:
 - We shared the three important tasks above and got some feedback about what we need to do for the design review on Friday, September 14th.

Sep-6, Thursday

- Team meeting:
 - We discussed what power point slides we need to have and who is going to make which slide. (Slide due is by 3:00 pm of Saturday, September 8th)

Week 4 (Sep 10 – Sep 14)

- Due to 3 out of 4 team members who got sick, we couldn't be done with many things in this week. We just focused on and prepared for the detailed designed review (14th of Friday).

Sep-12, Wednesday

- The third client meeting:
 - Since we could not be ready to show our slides and solid works drawing package for the detailed design review the last week, we went over our slides with Dr.Beyerlein and Scott in this client meeting.
- Each of the members modified the assigned slides

Sep-13, Thursday

- The final version of the slides were sent to Dr. Beyerlein.

Sep-14, Friday

- Detailed design review

Week 5 (Sep 17 – Sep 21)

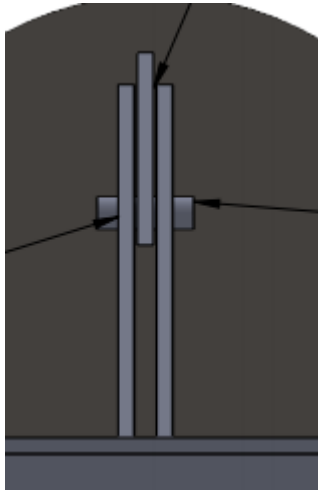
Sep-18, Tuesday

- Team meeting:
 - We discussed what we should talk in the 4th client meeting

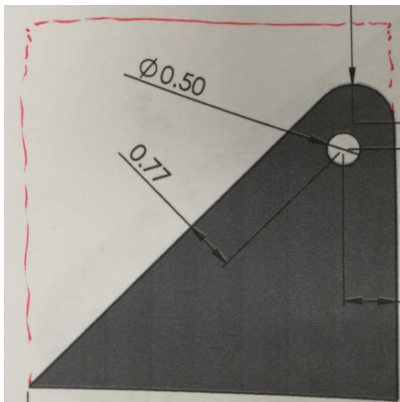
Sep-19, Wednesday

- The 4th client meeting:
 - 1. Moisture sensor**
 - We already received the moisture sensor from Scott today. So we are ready to resume our testing from now on.
 - 2. Our direction for this project:**
 - Scott told us that we are on the right track for this project. We just need to wait for some refinement from the fabrication team.
 - 3. Drawing package:**

- At this point, we don't have anything to do for the drawing package. However, Scott and the fabrication team might want to change some of the things below. The fabrication team is interested in reducing materials to use.



Just one support



Square shape rather than triangle

4. Senior Lab Project (Vibration testing project)

- Our objective for the senior lab project (Mia & Mike) is to measure the vibrations from the plant instrument and try to subtract those from moisture sensor signals so that we can clearly see only the signal of mass flow rate.
- Now we are try to prove why we can use our load cell as a vibration sensor and why our load cell is the best options over another type of vibration sensors.
- Also, we are doing some research about “vibration canceling” which got some ideas from “noise canceling”.

What Scott wants us to focus in the following weeks:

- We should do research about possible candidates for a damping material and a new load cell, and make a decision in this week. (Order those as soon as possible)
- Since we don't have anything to do for our drawing package now, we should focus on load cell testing and start moisture sensor testing.
- We should learn everything from Ankit in these two weeks before the plant shut down.

Sep-20, Thursday

- We tested the moisture sensor with Ankit, however, it did not return any output. We are guessing that it might be broken still. We contacted the manufacture again and explained how we set up our circuits. We also sent the email to Dr. Beylerlein and Scott to explain that we are not able to test our moisture sensor due to this problem.

Week 6 (Sep 24 – Sep 28)

※Note: Due to the test week for everyone, not many things have been done in the week 6. Hence, some important points are highlighted in this week rather than day-by-day record.

- Due to the test week for everybody, the weekly client meeting was canceled.
- Since we have portfolio due in week 7, we talked about who is going to update which section of the portfolio in the team meeting. The final draft of the portfolio is due 4th of October.
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Week 7 (Oct 1 – Oct 5)

Oct-, Tuesday

- Team meeting:
 - We discussed what we should talk in the 4th client meeting

Oct-3, Wednesday

- The 5th client meeting:
Moisture sensor
 - Moisture sensor is working with Scott's multimeter although it was not working with three different multimeter that we used.
 - Hence, we can just resume testing our moisture sensor with a new multimeter.
 - We might want to borrow a multimeter testing equipment from Scott.
 - We might want to purchase the manufacture's calibration tool.
 - Ask them 1. If they can send it to us
 - 2. If we can purchase it
 - 3. If we can build it

Feedback from SEL Engineers

- From UI Mechanical Engineering Advisory Board Meeting on Oct 1st
- We met one engineering from SEL and his major research field is mechanical vibrations. We (Mia and Mike) might need to talk to him to get some advice for our vibration cancelling project in ME430 (Senior Lab).
- We might need to characterize the natural frequencies of the measuring plates in our capstone project AND natural frequencies of the plant's instruments for vibration cancelling project in ME430.

Measuring plate:

- Scott was not able to instrument our final prototype of the measuring plate because it was too big.

Our next tasks:

- Just focus on moisture sensor(capstone) and vibration cancellation(ME430)
- Solidworks for moisture sensor needs to be done.
- Purchasing industrial unit for circuits for implementation (including signal amplifier, industrial power supply, industrial load cell hardware, and industrial moisture sensor hardware) ->> Scott needs to buy one sometimes soon.
- Snapshot 3: Prepare just like we did in the UI Mechanical Engineering Advisory Board Meeting. Update the rest of the schedule.

Week 8 (Oct 8 – Oct 12)

Since week 8 was snapshot 3 and logbook submission week, we spent our time to prepare for those big events.

Oct-10, Wednesday

- The 6th client meeting:

Moisture sensor:

- Our client wants some kind of system to keep the moisture sensor away from the bin in case of bin fire. Also, he wants something to cover the hole. (After the moisture sensor is removed, the hole will appear and some wood chips would fall from there. Also our client doesn't want additional air go into the bin to avoid more fire.)

Owner's manual:

- We should write owner's manual so that the next capstone team can easily set up what we built so far and do troubleshooting whenever something happens.

Week 9 (Oct 15 – Oct 19)

Oct-16, Tuesday

- Team meeting:
 - We brainstormed the system to get our moisture sensor away from the bin and cover the hole in case of the bin fire.
 - We brainstormed what contents we should have for the owner's manual (our final report for the capstone project).
 - We discussed what we need to talk in the client meeting.

Oct-17, Wednesday

- The 7th client meeting:
Moisture sensor
 - We shared our possible design ideas of moisture sensor system. It seems that our team need more brainstorming to narrow our ideas down.
 - Since we do not have enough time to build the system, Dr. Beylerlein suggested us to make some visualization using laser cutter so that visitors in snapshot 4 at least can understand how the moisture sensor system works.

Final report, poster, wikipage, and snapshot 4

- We talked about the expectation for our final report, wikipage, and snapshot 4.
- Final report: Summarization of our work and entire project. This can be combined with the owner's manual.
- Wikipage: Summarization of work and our final designs
- Poster for mini EXPO: The draft for the poster should be completed before thanksgiving break.

Week 10 (Oct 22 – Oct 26)

Oct-23, Tuesday

- Team meeting:
 - We discussed what we should talk in the 4th client meeting
 - We brainstormed the system to get our moisture sensor further and ended up two possible design ideas.
 - We brainstormed what contents we should have for the owner's manual (our final report for the capstone project).

Oct-3, Wednesday

- The 8th client meeting:
Moisture sensor
 - We provided two possible design ideas shown below:



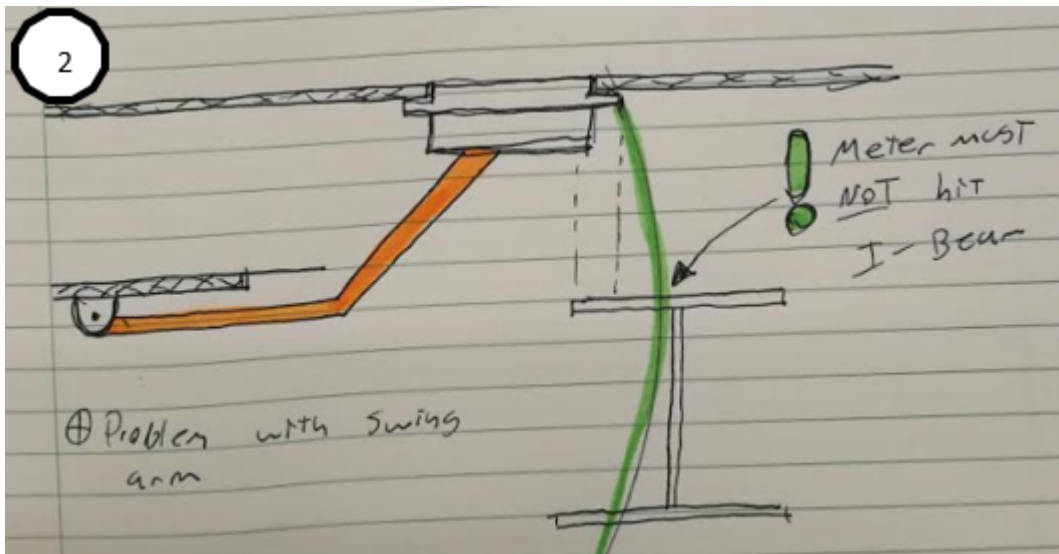


Figure: Swinging idea. The operator can pull some kind of cord and the moisture sensor attaching to the swinging arm will fall. This will require minimum task to do for plant operators.

- Our client liked our second idea since tasks for plant operators should be as minimum as possible in case of the bin fire.

Table of contents for the final report and wikipage:

- We provided the possible table of contents for our final report and wikipage, and obtained some feedback from Dr. Beyerlein.

Week 11 (Oct 29 – Nov 2)

Oct-30, Tuesday

- Team meeting:
 - We brainstormed the system to get our moisture sensor further.

Oct-31, Wednesday

- The 9th client meeting: No general client meeting since Dr. Beyerlein was out of town and some of our members had the exams on this date. Only Zak was able to see the client. He consulted the design ideas with our client directly.

Nov-1, Thursday

- We brainstormed the system to get our moisture sensor further.
- We modified our table of contents for the final report and wikipage, and assigned each person to write some sections.
- We talked about our schedule for the following weeks.

Nov 9 (Fri): Due date for the first draft for the final report

Nov 12 -16 (Weej 13): Make the first draft of poster and presentation slides for the snapshot 4. Laser cutting the moisture sensor system should be done in this week too.

Nov 30 (Fri): Snapshot 4

Week 12 (Nov 5 – Nov 9)

Nov-6, Tuesday

Week 13 (Nov 12 – Nov 16)

Nov-6, Tuesday